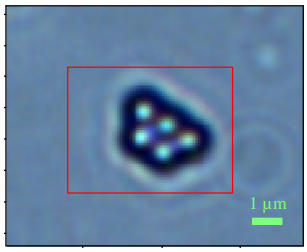
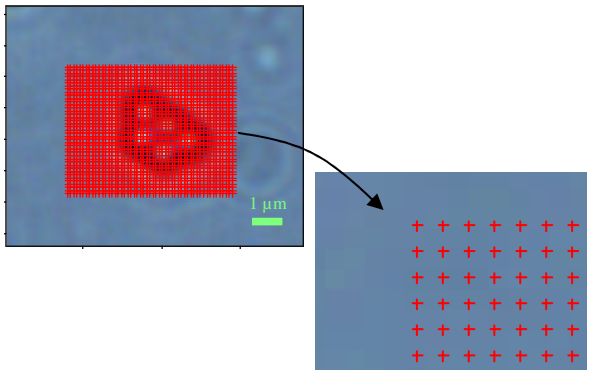
Show data limits

When "Show data limits" is ticked, the mapping area is superimposed on the video image.



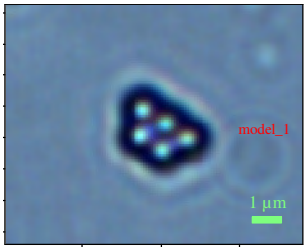
Show data points

When "Show data points" is ticked, the individual acquisition positions for the map are superimposed on the video image.



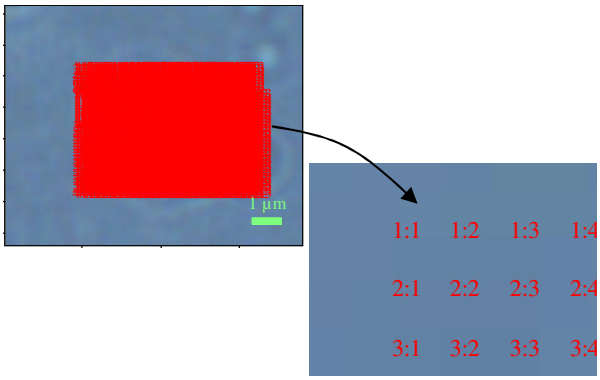
Show data name

When "Show data name" is ticked, the name of the image component is superimposed on the video image.



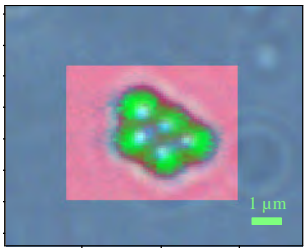
Show index

When "Show index" is ticked, the XY index of the individual acquisition positions for the map are superimposed on the video image.



Overlay images

When "Overlay images" is ticked the Map or Score image is superimposed on the video image. Note that the overlay mode in the Map/Score window will be reflected in the superimposition.



Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

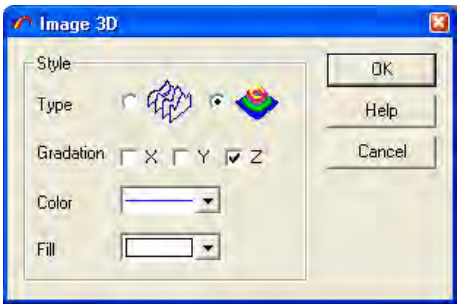
The superimposed image will always be displayed in True Color, whatever the palette setting in the Colors dialog window – see section 8.6, page 210.

Font
Select the font style for the data index and data name text display from the "Font" drop down box. Note that the font color is automatically assigned by LabSpec 5 to match the color of the object being superimposed.

Available for: *Video*

8.18. Image3D

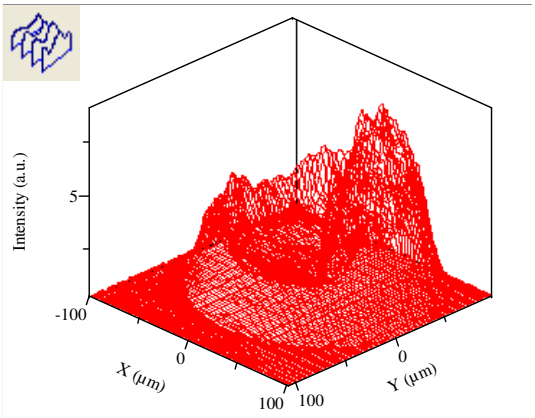
The Image3D dialog window allows control of formatting and display options for 3D images. It should be used in conjunction with the Colors dialog window (see section 8.6, page 210).



Type
Select the display mode from the following options:

- Line

  The line color is selected from the "Line" drop down box.

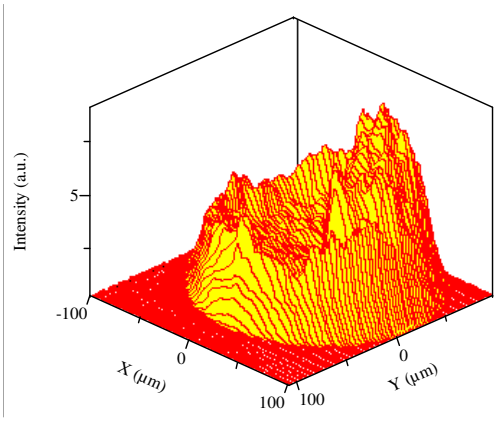


Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

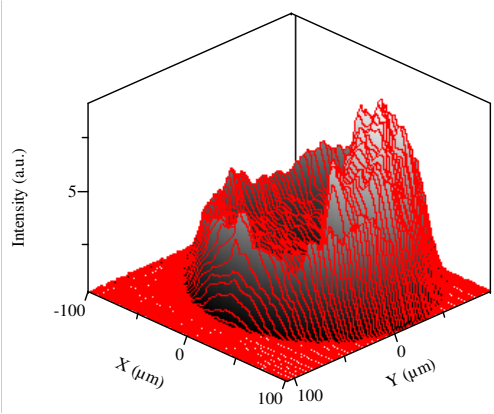
- Line and Fill

The line color is selected from the “Line” drop down box. The line display can be removed by setting the line color to “None”.

When there is no “Gradation” selected (i.e., X, Y and Z gradation boxes are all unticked) the fill color is selected from the “Fill” drop down box. The example shown right is displayed without gradation.



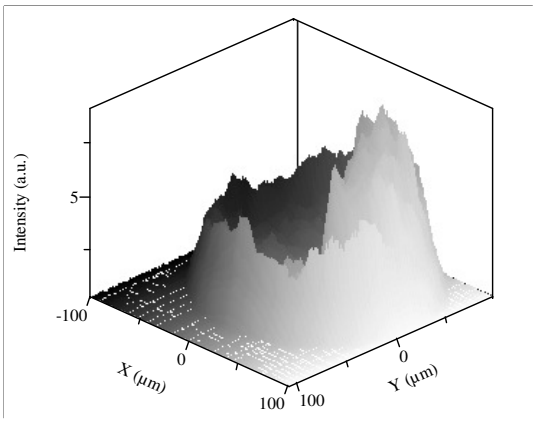
When “Gradation” is selected (i.e., one or more of the X, Y and Z gradation boxes are ticked) the graded fill color is set according to the palette selected in the Colors dialog window (see section 8.6, page 210). The example shown right is displayed with Z gradation using a greyscale palette.



Gradation

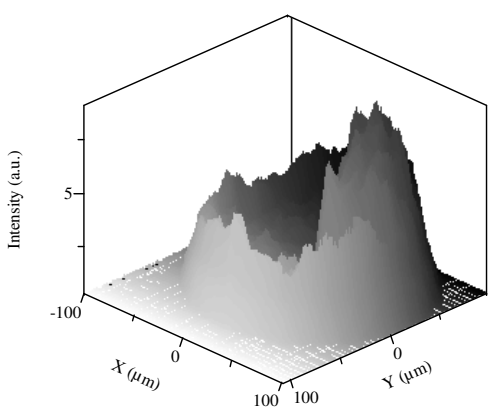
Select the axis (or axes) direction for graded fill color:

- X – graded fill from low X axis value to high X axis value.

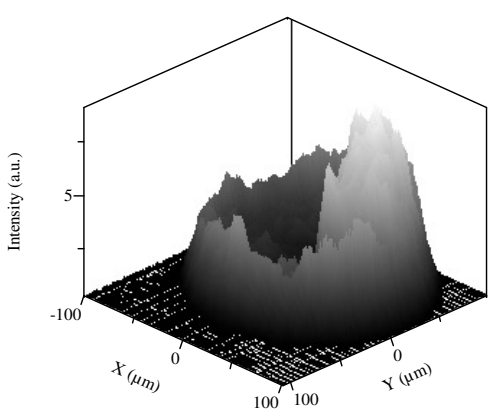


Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

- Y – graded fill from low Y axis value to high Y axis value.



- Z – graded fill from low Z (intensity) axis to high Z (intensity) axis.



Color
Select the line color from the "Color" drop down box.

Note that the Line and Width options in this drop down box are not active for 3D images.

Fill
Select the fill color from the "Fill" drop down box. The fill color selected in the "Fill" drop down box is only displayed when the "Line and Fill" type is selected, and no gradation option is selected (see above). If a gradation option is selected, the fill color is set according to the palette selected in the Colors dialog window (see section 8.6, page 210).

Note that the Fill option in this drop down box is not active for 3D images.

Available for: Video, SpIm, Map, Score (when displayed in 3D mode)

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

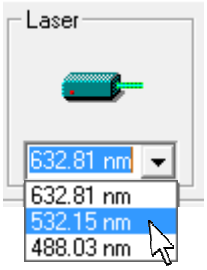
9. Control Panel

The Control Panel located at the bottom of the screen contains sections which are directly related to the hardware configuration of the instrument. This panel will *only* show sections for devices which are correctly installed and configured. The description below shows all of the standard sections, but be aware that some of these may not be visible in your software.

9.1. Laser

The drop down box lists all of the laser wavelengths available on the instrument.

Click on the drop down box to display the list, and then select the laser wavelength to be used.



On fully automated systems (such as LabRAM ARAMIS, automated LabRAM HR, or XploRA) the necessary hardware and optics will switch automatically.

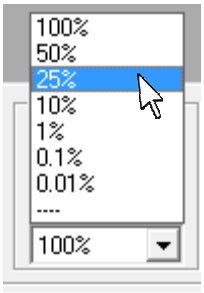
On manual systems (such as LabRAM 300, LabRAM 1B, manual LabRAM HR, U1000 or T64000) remember to change the optics necessary to use the selected laser. These optics include switching mirror(s), interference filter(s) and notch/edge filter(s).

9.2. Filter

Most systems have a number of neutral density filters available which can be used to reduce the laser power incident on the sample. Typically these are necessary if the sample is sensitive to the laser power, and burns/degrades when the full power is used. Note that the detected Raman signal is proportional to laser power, so the lower the laser power the longer your measurement will need to be to obtain a good quality Raman spectrum.

These filters are motorized, and will automatically be inserted into the laser path once selected.

The drop down box lists all of the filters available on the instrument. These will be displayed either in optical density (OD) or percentage (%). The following table shows the relationship between OD and % values.



Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

OD	%
- - -	100% (no attenuation)
D0.3	50%
D0.6	25%
D1	10%
D2	1%
D3	0.1%
D4	0.01%

Click on the drop down box to display the list, and then select the laser wavelength to be used.

9.3. Hole

The confocal hole is used to define the spatial resolution and analysis volume of a measurement, and should be used in conjunction with correct choice of microscope objective and laser wavelength to fully optimise a measurement.

Typically the confocal performance of a system improves (i.e., the spatial resolution increases) as the confocal hole diameter decreases.

Confocal analysis
Confocal analysis means the measurement will be made with high spatial resolution, suitable for analysis of true microscopic particles and thin layers with dimensions in the range 500nm – 10µm. To analyze these types of samples the hole should be set to a small diameter. Note that in a confocal mode you are analysing less molecules (because the analysis volume is small), and the signal level you observe will decrease.

Macro or bulk analysis
For analysis of bulk powders and liquids, or any sample where high spatial resolution is not necessary, it is best to run the system in a non-confocal mode. By setting the hole diameter to a large value the spatial resolution will be low, and the analysis volume of the measurement will be increased. Note that in a non-confocal mode you are analysing more molecules (because the analysis volume is large), and the signal level you observe will increase.

Some instruments have fully adjustable holes, whilst others have fixed hole settings. The controls on these are different.

9.3.1. Control of fully adjustable hole

Type in the desired diameter of the hole, and press **<enter ↵ >** so that the value is registered.

Click on the left hand arrow to send the hole to a closed position (0 µm diameter).

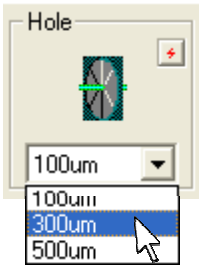
Click on the right hand arrow to send the hole to its maximum position.

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Click on the initialization icon to send the hole to its reference position, and then back to the displayed diameter.

9.3.2. Control of fixed position hole

The drop down box lists all of the hole diameters available on the instrument.



Click on the drop down box to display the list, and then select the hole diameter to be used.

Click on the initialization icon to send the hole to its reference position, and then back to the displayed diameter.

9.4. Slit

The slit is used to define spectral resolution, and should be used in conjunction with correct choice of laser wavelength and diffraction grating. On most systems equipped with array detectors (such as a CCD or InGaAs array) the diffraction grating (see section 9.6.1, page 231) has a more significant effect on spectral resolution than the slit. The slit should only be adjusted once a suitable diffraction grating has been selected.

Typically the spectral resolution of a system will increase as the slit width is decreased. High spectral resolution (obtained with a narrow slit width) allows subtle changes in a spectrum to be confidently analyzed, and close lying peaks to be separated.

Some instruments have fully adjustable slits, whilst others have fixed slit settings. The controls on these are different.

9.4.1. Control of fully adjustable slit

Type in the desired diameter of the slit, and press **<enter ↵ >** so that the value is registered.

Click on the left hand arrow to send the slit to a closed position (0 µm width).

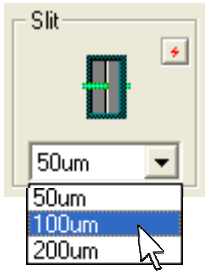
Click on the right hand arrow to send the slit to its maximum position.

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Click on the initialization icon to send the slit to its reference position, and then back to the displayed width.

9.4.2. Control of fixed position slit

The drop down box lists all of the slit diameters available on the instrument.



Click on the drop down box to display the list, and then select the slit diameter to be used.

Click on the initialization icon to send the slit to its reference position, and then back to the displayed width.

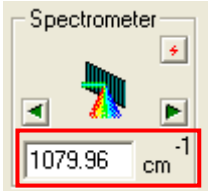
9.5. Spectrometer

The spectrometer control allows the wavelength (nm) or wavenumber (Raman shift, cm^{-1}) position to be selected. With an array detector (such as CCD or InGaAs array) the specified wavelength/wavenumber position lies at the center of the detector, and a certain range either side of this position will be detected. The precise range depends upon the spectrometer focal length, laser wavelength, and diffraction grating.

As an example, if the spectrometer position is set at $1500cm^{-1}$ then the lowest position could be $970cm^{-1}$, and the highest position could be $2030cm^{-1}$. The central position in the spectrum will be $1500cm^{-1}$.

The spectrometer position can be quickly controlled, allowing you to monitor Raman peaks in a specific area of the full spectrum. In most cases, the detected range will be less than the full Raman spectrum range, which is typically $100\text{-}4000cm^{-1}$. If you wish to acquire a spectrum across the full Raman range then you should use the Extended Range mode – see section 3.5.6, page 49.

Type in the desired central position of the spectrometer, and press **<enter ↵ >** so that the value is registered. The current units will be displayed next to the input box.



Click on the left hand arrow to send the spectrometer to the calibration 'Zero Order' position (0 nm).

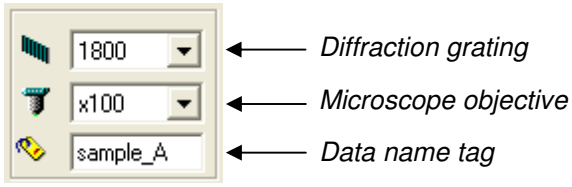
Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Click on the right hand arrow to send the spectrometer to its maximum position. Note that the maximum position will depend upon the spectrometer, laser and diffraction grating.

Click on the initialization icon to send the spectrometer to its calibration position, and then back to the displayed position.

9.6. Options

The Options section allows you to specify the diffraction grating, microscope objective and data name tag.



9.6.1. Diffraction grating

The diffraction grating is the dispersing optical element within the spectrometer, which splits the spectrum into its constituent colours.

Each grating offers a certain level of dispersion (which affects the spectral resolution of the system) and wavelength coverage (which affects the spectrum intensity, and compatibility with particular laser wavelengths). Gratings are typically classified by a number of grooves per mm – for example, 300gr/mm (low resolution) or 3600gr/mm (high resolution). The higher the number the higher the achievable spectral resolution.

Each system is equipped with different diffraction gratings, which are chosen to take into account the available laser wavelengths and requirements for spectral resolution.

Most instruments have grating turrets, with multiple gratings attached. This allows you to quickly switch from one grating to another (for example, to switch from low resolution to high resolution analysis). The following list shows the standard maximum number of gratings available on the turret:

1 grating (fixed position):	HE spectrograph, Axial spectrograph
1 grating:	U1000, T64000
2 gratings (manual switching):	LabRAM 300 / 1B (and IR, IR^2 and INV configurations)
2 gratings (motorized switching):	LabRAM HR (and IR, IR^2 and INV configurations)
4 gratings (motorized switching):	LabRAM ARAMIS (and IR and IR^2 configurations), XploRA

It is also possible to manually exchange diffraction gratings on the LabRAM HR base unit, U1000 and T64000. For example, a LabRAM HR could be equipped with three diffraction gratings in total. Two would be mounted on the motorized turret, and the third would be kept in a box by the system. One

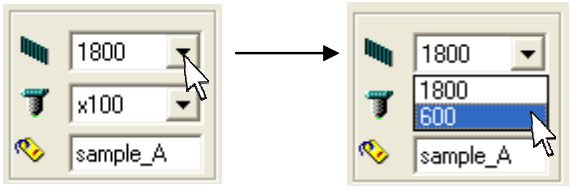
Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

of the gratings on the turret could be exchanged with the third grating if desired. Manually exchanging grating typically takes a few minutes to complete, and there is no optical realignment required.

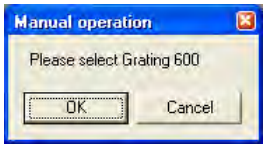
9.6.1.1. Selecting a grating (manual turret)

The drop down box lists all of the diffraction gratings available on the instrument.

Click on the drop down box to display the list, and then select the diffraction grating to be used.



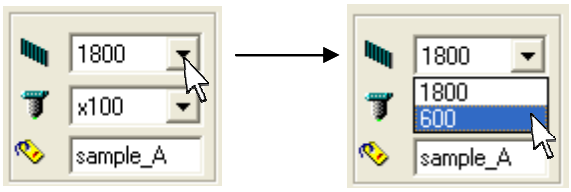
A message will prompt you to now manually select the desired diffraction grating. Typically this is done on the instrument using a push-pull bar, or other switching device. Once the diffraction grating is selected click **[OK]**.



9.6.1.2. Selecting a grating (motorized turret)

The drop down box lists all of the diffraction gratings available on the instrument.

Click on the drop down box to display the list, and then select the diffraction grating to be used. The diffraction grating will now be moved into position by the software.



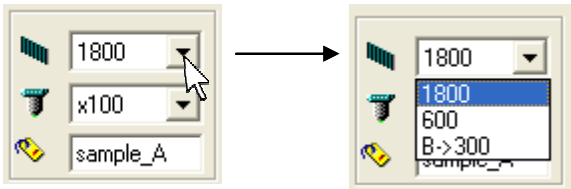
9.6.1.3. Selecting a grating for manual exchange

The drop down box lists all of the diffraction gratings available on the instrument.

Click on the drop down box to display the list. Gratings available for manual exchange are listed with either “A->” or “B->” in front of their identifier.

This implies that they are intended to be exchanged in the A position of the turret, or the B position of the turret. The first grating listed (in this case 1800) is in the A position. The second grating listed (in this case the 600) is in the B position.

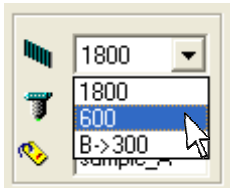
This example shows that there is also a 300gr/mm grating which could be exchanged in the B



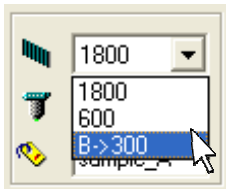
Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

position. This means that it would replace the current 600gr/mm grating.

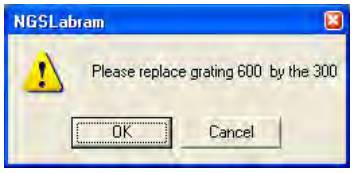
To replace the diffraction grating first select the diffraction grating you wish to replace, and send the spectrometer to Zero Order (see section 9.5, page 230). Now take out the current diffraction grating, and replace it with desired replacement diffraction grating.



Once the manual exchange is complete, now select the replacement diffraction grating in the drop down list.



A message box will appear prompting you to replace the grating. Click **[OK]**.



CAUTION: THE DIFFRACTION GRATING IS EXTREMELY FRAGILE AND EXPENSIVE. ON NO ACCOUNT SHOULD YOU TOUCH OR SCRATCH THE SURFACE OF THE GRATING. AS SOON AS IT IS REMOVED FROM THE INSTRUMENT IMMEDIATELY PLACE IT IN ITS PROTECTIVE CASING.

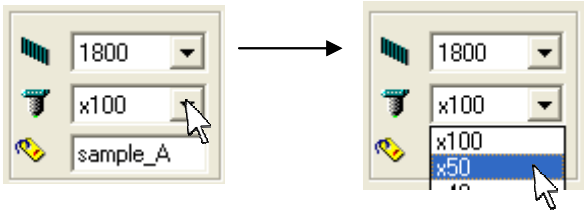
9.7. Microscope objective

On most systems the microscope is manually controlled, and objectives must be manually selected and exchanged. However, it is important that the correct objective is also selected in LabSpec 5 in order to have correctly scaled video images, and for Raman maps to be acquired over the correct part of the sample.

9.7.1.1. Selecting a microscope objective

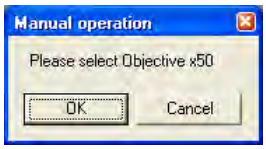
The drop down box lists all of the objectives available on the microscope.

Click on the drop down box to display the list and then select the objective to be used.



Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

A message will prompt you to now select the desired objective. Once the correct objective is selected on the microscope click **[OK]**.

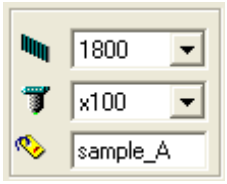


9.8. Data name tag

The data name tag is a prefix which is used for every newly acquired spectrum. In addition, it is used as the default file name during a File > Save As procedure.

If the data name is unchanged for multiple accumulations each new spectrum will be acquired with the same prefix, and then sequentially numbered.

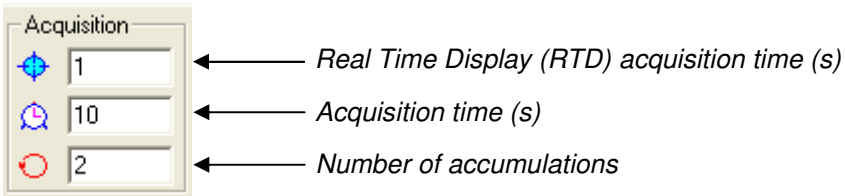
In the example shown to the right, the data name tag has been set as *sample_A*. Each spectrum will be acquired as *sample_A_1*, *sample_A_2* etc.



If the data name tag is left blank, as in this example, then spectra will be automatically labelled as *_1*, *_2* etc.

9.9. Acquisition

The Acquisition section allows the user to specify acquisition times (also called exposure times) for the Real Time Display, Spectrum Acquisition and Mapping Acquisition, and the number of accumulations (or averages) for each measurement.



9.9.1. Real Time Display (RTD) acquisition time

The Real Time Display (RTD) provides a continuous readout of the detector, and is useful to adjust the fine focus of the sample to optimise Raman signal, and to monitor whether a sample is degrading or burning. The RTD is started using the / icon – see section 4.5.1, page 95, for more details.

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Normally the RTD acquisition time should be kept small in order to allow fast and continuous spectrum read out. Typical values are in the range 0.2s–2s.

To adjust the RTD acquisition time simply type the desired time (in seconds) into the box, and press **<enter ↵ >**.

9.9.2. Acquisition time

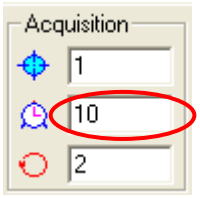
The acquisition time is the time taken to acquire a Raman spectrum. Typically the longer the acquisition time the better quality the resulting spectrum. The acquisition time set affects the Spectrum Acquisition (/ ; see section 4.5.3, page 96) and Mapping Acquisition (/ ; see section 4.5.4, page 96).

Note that for an extended range spectrum acquisition (see section 3.5.6, page 49) the acquisition time is the time taken for each spectral window within the full spectral range. For multidimensional spectral array measurements, the acquisition time is the time taken for each spectral window of each spectrum acquisition in the array.

Minimum acquisition times are in the order of 0.2s-0.5s for standard Raman spectra and mapping experiments, and <50ms for SWIFT ultra-fast Raman mapping experiments.

There is no maximum value for the acquisition time, since this will depend on the desired spectrum quality – however, the CCD detector will saturate at and above a particular signal level, so it is important that the acquisition time is not so large that saturation occurs. The saturation level depends on the specific detector installed on your system. Modern detectors generally saturate at approximately 65,000 counts, whereas older detectors may saturate at lower values (such as approximately 32,000 counts).

To adjust the acquisition time simply type the desired time (in seconds) into the box, and press **<enter ↵ >**.



9.9.3. Number of accumulations

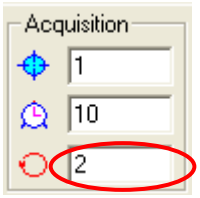
Acquiring multiple accumulations of data and averaging them results in improved spectrum quality. However, with array detectors such as CCDs and InGaAs arrays it is generally best to improve spectrum quality by first increasing the acquisition time. When the saturation point is reached, then it is worth increasing the number of accumulations.

Depending on the chosen mode of the spike (or cosmic ray) filter (see section 3.5.4.7, page 37) it is recommended to have a minimum of two accumulations so that the spike filter can detect and remove random spikes in the spectrum.

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Data from multiple accumulations will either be averaged, or summed – the desired mode can be selected from Acquisition > Options (see section 3.5.4.6, page 37).

To adjust the number of accumulations simply type the desired number into the box, and press **<enter ↵ >**.



9.10. XYZ Coords

The XYZ Coords section shows the current position (in micrometers, µm) of installed XY and Z stages. It can be used for a number of functions:

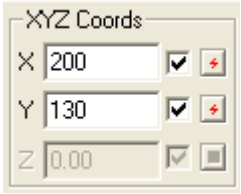
- Move the stage by a set distance by inputting a value, rather than using the joystick
- Noting a reference position on a sample, and returning to that position as required
- Measuring distances moved by the stage
- Switching between different stage configurations (for example, motorized XY stage and DuoScan™).

There are a number of variants of the XYZ Coords section, depending on the system configuration. The operation of each variant is described below.

9.10.1. Using XYZ Coords

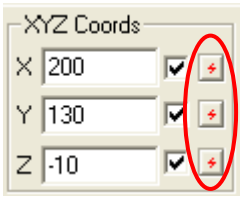
The current stage position (X, Y and Z coordinates) are shown in the respective boxes. The units are micrometers (µm). The tick boxes must be ticked for coordinate read out to be active for each axis.

Note that if one of the stages is not present (for example, the Z stage) then it will be greyed out.

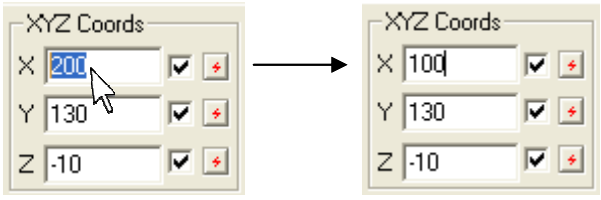


Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

The current position coordinates can be set to 0 µm by clicking on the 'set current position as origin' icons for each axis.



To move the stage to a specific position highlight the current value and type in the desired position (in micrometers, µm). Press **<enter ↵ >**. The stage will now move to the desired location.



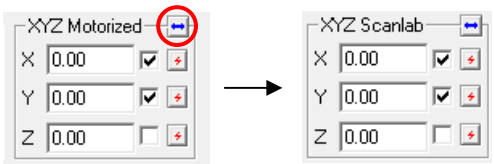
CAUTION: MOVE THE STAGE WITH CAUTION, SINCE IT IS POSSIBLE TO DAMAGE THE SAMPLE, STAGE OR MICROSCOPE OBJECTIVE IF THE SAMPLE HEIGHT IS NOT CHECKED. THERE IS PARTICULAR RISK WHEN THE Z STAGE IS USED WITH HIGH MAGNIFICATION OBJECTIVES.

The coordinate read out and control can be deactivated for each axis independently by unticking the respective tick box.

9.10.2. Using XYZ Coords with multiple stages

The main control of XYZ Coords when multiple stages are configured and active is identical to that outlined above (see section 9.10.1, page 236). Note that the name of the XYZ stage is displayed in this section – typically the stages will be "XYZ Motorized" for a standard motorized stage, and "XYZ Scanlab" for the DuoScan™ stage (see section 4.5.10, page 110)

Click on the 'switch stage' icon, to select the desired stage.



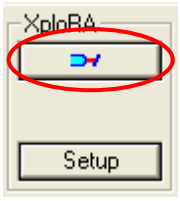
Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

9.11. Instrument Setup

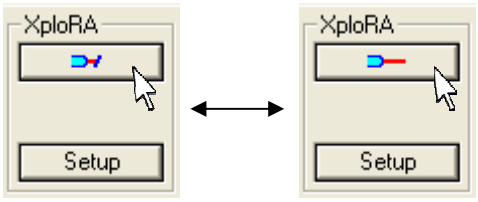
The Instrument Setup section is only present for the XploRA™ or LabRAM ARAMIS systems. It allows control of the laser beam (on/off) and other hardware options (such as polarizors, trinocular head, macro chamber etc).

9.11.1. Control of Laser Beam (for XploRA™)

On the XploRA™ system the selected laser (see section 9.1, page 227) can be turned on or off using the laser toggle switch.



Click on the toggle switch to turn the laser on and off.

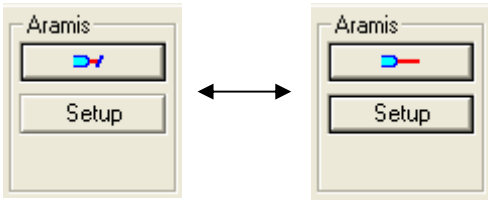


Laser off **Laser on**

9.11.2. Control of Laser Beam (for LabRAM ARAMIS)

On the LabRAM ARAMIS system the mechanical shutter for the selected laser (see section 9.1, page 227) can be opened or closed using the toggle switch. When the shutter is open the sample will be exposed to the laser (if the laser is turned on and active).

Click on the toggle switch to open or close the shutter.



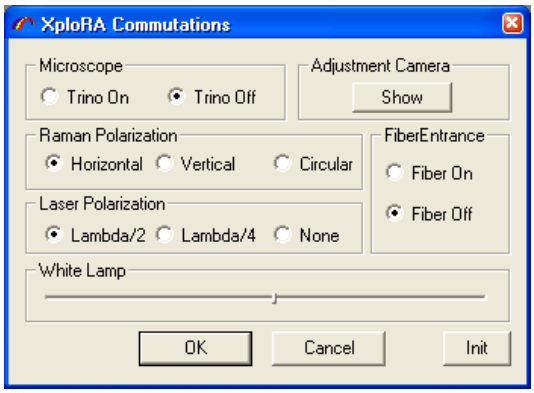
Laser shutter closed **Laser shutter open**

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

9.11.3. Control of Hardware Options (for XploRA™)

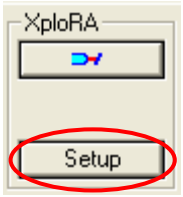
The XploRA Setup window allows control of the following optional items:

- Trinocular head on the microscope
- Raman polarizors
- Laser polarizors
- Internal adjustment camera
- White lamp illuminator for the internal adjustment camera
- Fibre entrance



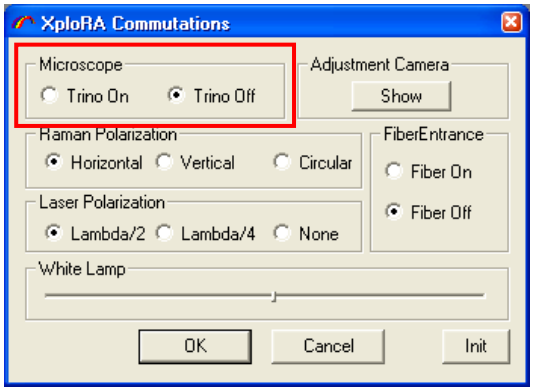
Please note that depending on the configuration of your system certain items in the Setup window may be greyed out.

The XploRA Setup window is opened by clicking on the Setup button.



9.11.3.1. Microscope

Select {Trino On} or {Trino off} to control the optical path to the trinocular head.



Trino On
Microscope eye pieces and top camera are active; Raman path is inactive.

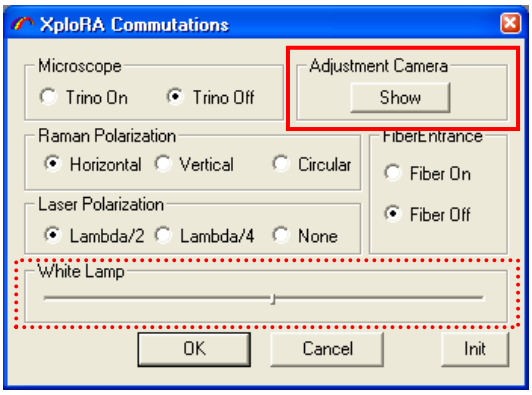
Trino Off
Raman path is active; microscope eye pieces and top camera are inactive.

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

9.11.3.2. Adjustment Camera

Click on **[Show]** to activate the internal adjustment camera and to switch the microscope to "Trino Off" mode.

This camera is useful to visualize the laser spot on the sample. White light illumination can be provided using the "White Lamp" slider bar to control an internal white LED, or by using the standard XploRA™ microscope illumination options.



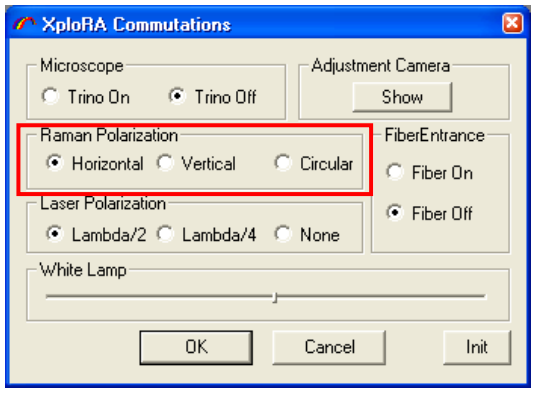
9.11.3.3. Raman Polarization

Select {Horizontal}, {Vertical} or {Circular} to insert a polarizor element into the Raman beam path to control the polarization of the analyzed Raman signal.

Horizontal
Only Raman signal which is horizontally polarized will be detected.

Vertical
Only Raman signal which is vertically polarized will be detected.

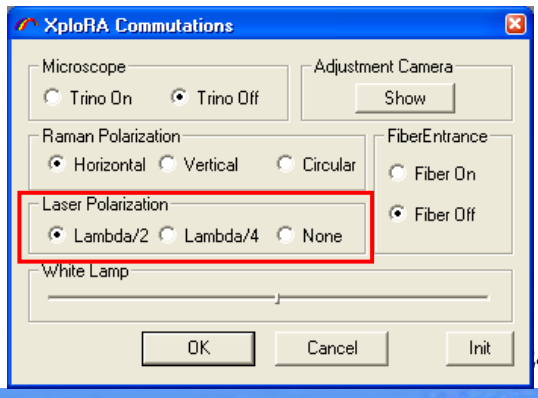
Circular
All Raman signal will be converted to circularly polarized light prior to detection. Most spectrometers have different sensitivities for horizontally and vertically polarized light. By converting the signal from horizontal/vertical polarization to circular polarization the difference in spectrometer performance will be removed, and all light will be detected in exactly the same way.



9.11.3.4. Laser Polarization

Select {Lambda/2}, {Lambda/4} or {None} to insert a polarizor element into the laser beam path to adjust the polarization of the laser beam.

Lambda/2 (or $\lambda/2$)
Rotates the laser beam polarization by 90°.



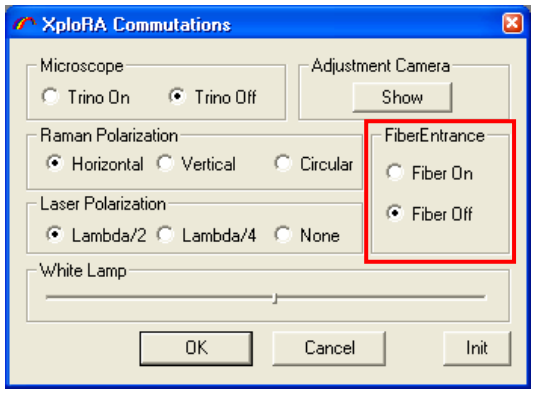
Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Lambda/4 (or $\lambda/4$)
Converts the laser beam polarization from linearly polarized to circularly polarized.

None
Leaves the laser beam with its intrinsic linear polarization.

9.11.3.5. Fiber Entrance

Select {Fiber On} or {Fiber Off} to select whether the Raman signal is detected from the microscope, or from a separate fiber optically coupled remote Raman probe head, such as a SuperHead.

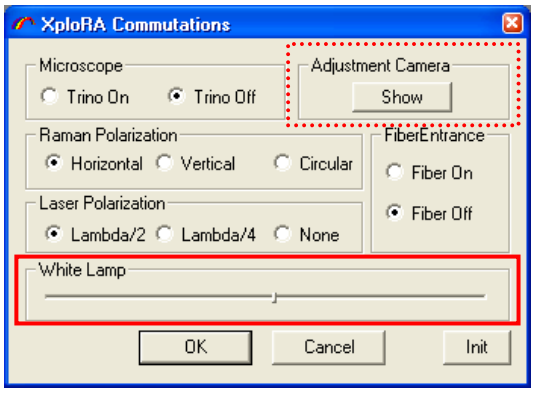


Fiber On
In this mode, only Raman signal which is delivered via a fibre optic to the FC connector on the underside of the XploRA™ platform will be detected. You should select this mode if you wish to work with a remote Raman probe.

Fiber Off
In this mode, Raman signal which originates from the microscope will be detected. You should select this mode if you wish to make 'standard' microscope measurements with the XploRA™.

9.11.3.6. White Lamp

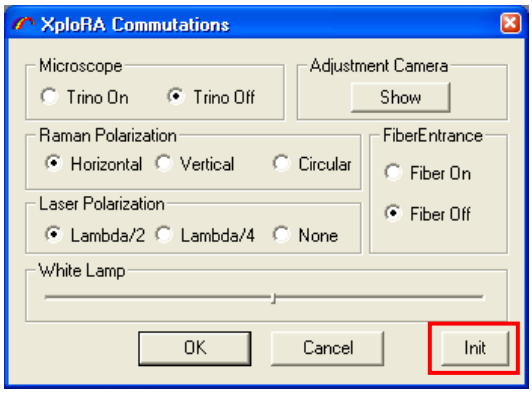
The White Lamp slider controls the intensity of an internal white LED to illuminate the sample when it is visualized using the internal Adjustment Camera.



Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

9.11.3.7. Init

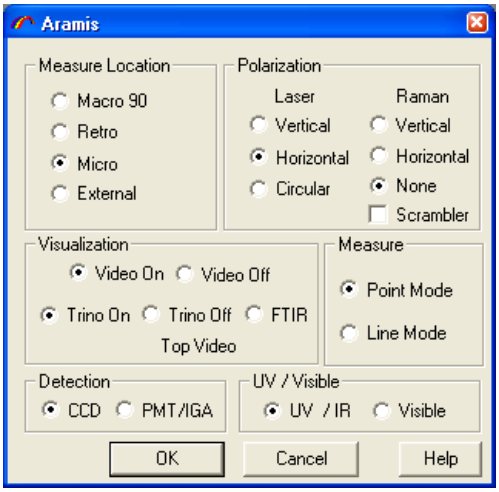
The **[Init]** button will re-initialize all of the XploRA motors, and confirm that they are at their correct positions.



9.11.4. Control of Hardware Options (for LabRAM ARAMIS)

The LabRAM ARAMIS Setup window allows control of the following optional items:

- Measurement location (microscope, fibre optic probe, macro chamber)
- Laser and Raman path polarizors
- Trinocular head on the microscope
- Multiple detectors
- "Point Mode" and "Line Mode" optics
- UV/IR and visible dual path optics

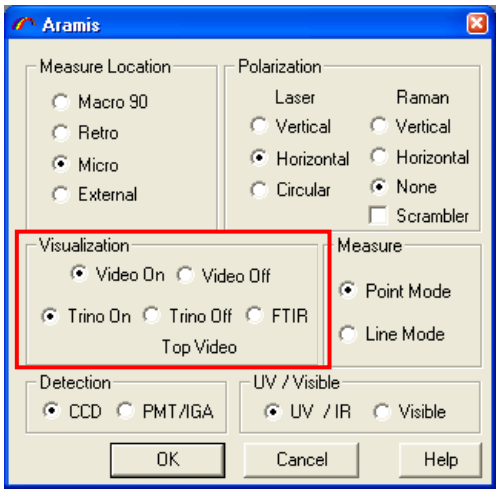


Please note that depending on the configuration of your system certain items in the Setup window may be greyed out.

The LabRAM ARAMIS Setup window is opened by clicking on the Setup button.

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

9.11.4.1. Visualization



Select {Video On} or {Video Off} to control the internal camera optics.

Video On
Optics for internal camera and reflected white light illumination are in the light path; Raman path is inactive. This mode is used to visualize the sample and acquire white light images of the sample using the internal camera.

Video Off
Raman path is active; optics for internal camera and reflected white light illumination are out of the light path. This mode is used to acquire a Raman spectrum.

Select {Trino On}, {Trino Off} or {FTIR} in the "Top Video" section to control the optical path to the optional trinocular head and FTIR module

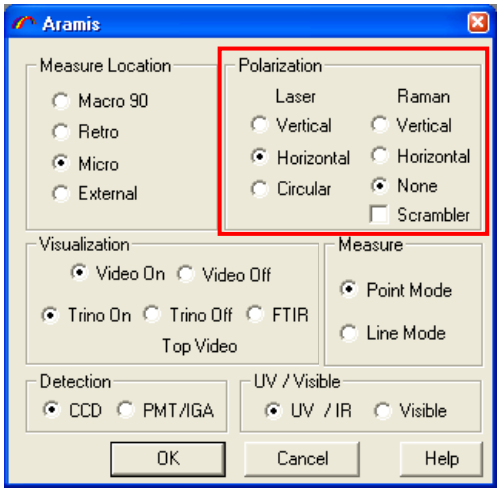
Trino On
Microscope eye pieces and top camera are active, with illumination beam splitter in place; Raman path, internal camera optics and FTIR module are inactive.

Trino Off
Raman path and internal camera optics are active; microscope eye pieces, top camera and FTIR module are inactive.

FTIR
FTIR module is active; Raman path and internal camera optics are inactive; microscope eye pieces and top camera are active for transmitted white light illumination only, and inactive for reflected white light illumination.

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

9.11.4.2. Polarization



Select the required polarizor element to control the polarization of the laser beam and the analysed Raman signal.

Laser - Vertical
Allows the laser beam to be linearly polarized in a vertical orientation.

Laser - Horizontal
Allows the laser beam to be linearly polarized in a horizontal orientation.

Laser - Circular
Converts the laser beam polarization from linearly polarized to circularly polarized.

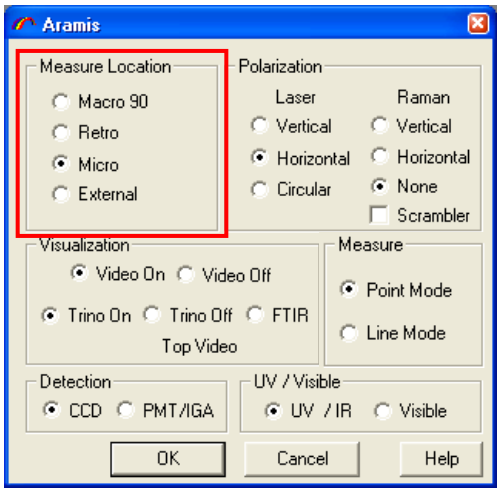
Raman - Vertical
Only Raman signal which is linearly polarized in a vertical orientation will be detected.

Raman - Horizontal
Only Raman signal which is linearly polarized in a horizontal orientation will be detected.

Raman - Circular
All Raman signal will be converted to circularly polarized light prior to detection.

Raman – Scrambler
The polarization of the Raman signal will be scrambled (removed) prior to detection.

9.11.4.3. Measure Location



Select the required measurement location on the system, including the microscope, macro chamber and external fibre optically coupled probes.

Macro 90
In this mode, Raman signal which originates from the macro chamber in a 90° orientation will be detected. You should select this mode if you wish to analyse bulk materials in the macro chamber using a 90° orientation.

Retro
In this mode, Raman signal which originates from the macro chamber in a 180° back scattering (retro) orientation will be detected. You should

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

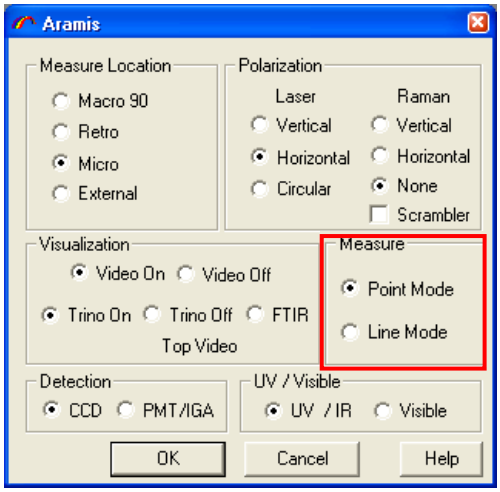
select this mode if you wish to analyse bulk materials in the macro chamber, using a back scattering geometry.

Micro
In this mode, Raman signal which originates from the microscope will be detected. You should select this mode if you wish to make 'standard' microscope measurements with the LabRAM ARAMIS.

External
In this mode, Raman signal which originates from an external location will be detected, using the fiber optical input. The light is passed directly from the fiber optical input into the spectrometer, bypassing the microscope optics. You should select this mode when working with SuperHead fiber optic remote probe heads

9.11.4.4. Measure

Select {Point Mode} or {Line Mode} to control the optics for standard spot analysis or confocal line scan analysis.



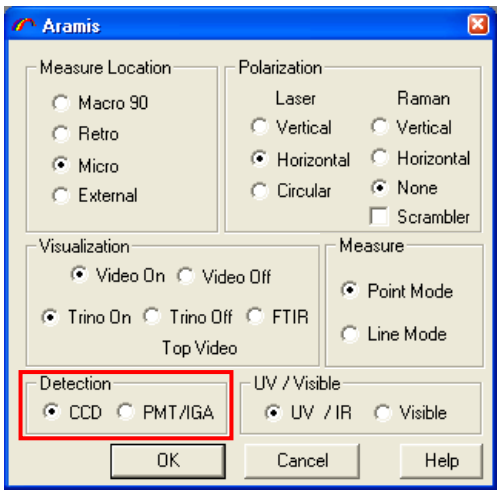
Point Mode
Sets up the measurement for standard spot (or point) analysis. You should select this mode if you wish to make 'standard' measurements with a 0.5-10µm laser spot.

Line Mode
Sets up the measurement for confocal line scan analysis. You should select this mode in combination with the LineScan scanning mirror controller, which allows the laser spot to be rapidly rastored across the sample. This is useful for acquiring an average spectrum from along the entire line, and for fast Raman mapping applications.

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

9.11.4.5. Detection

Select {CCD} or {PMT/IGA} to control the optics for multiple detectors mounted on the LabRAM ARAMIS.

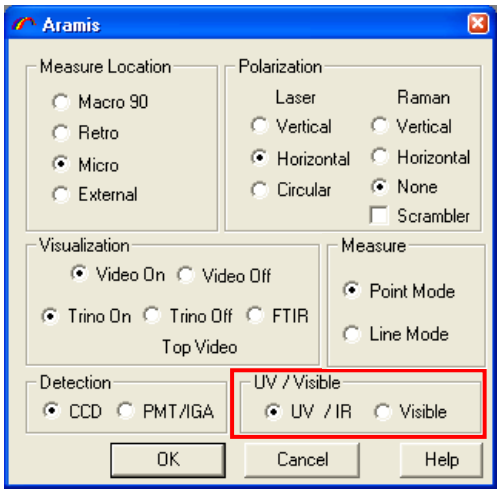


CCD
In this mode the standard CCD detector will be used for the analysis.

PMT/IGA
In this mode the detector mounted on the second port will be used for the analysis. Typically this detector will either be a photomultiplier tube (PMT), InGaAs array (IGA) or a second specialized CCD.

9.11.4.6. UV / Visible

Select {UV / IR} or {Visible} to control the dual path optics in the LabRAM ARAMIS, which allow optimised detection in either the UV/IR or visible spectral regions.



UV / IR
In this mode, mirrored optics are used which are optimised for UV and/or infra-red (IR) analysis.

Visible
In this mode achromatic lense optics are used which are optimised for standard visible analysis.

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

10. Appendix: Manual Wavelength Calibration of LabRAM Systems

The procedure outlined below can be used to manually calibrate the LabRAM systems (including LabRAM 300, LabRAM 1B, LabRAM HR, LabRAM ARAMIS, LabRAM INV, LabRAM IR and LabRAM IR^2).

The full calibration procedure uses two software parameters

- ZERO: for calibration of the diffraction grating's zero order peak position (0 nm)
- KOEFF: for calibration of the Raman peak position

Note that this calibration procedure is a diffraction grating calibration, and should be repeated for all diffraction gratings on the system. The software will retain individual calibration values for each diffraction grating.

A full calibration of a system with multiple lasers requires one of the lasers to be designated as the 'reference laser' – the wavelength of this laser is assumed to be constant, and known. The remaining laser wavelengths are then calibrated relative to the reference laser.

Before performing a manual calibration, ensure that all lasers which are to be used for the calibration have been turned on and left to warm up for a minimum of 15-30 minutes. This is essential to ensure the laser wavelength has stabilised.

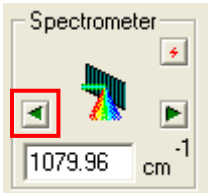
10.1. Calibration of Zero Order Position (ZERO)

Insert the silicon (Si) calibration sample underneath the microscope, and focus on it in the normal way, using a 50x or 100x magnification objective.

Selecting the diffraction grating you wish to calibrate, using the Diffraction Grating drop down box in the control panel.

Select the reference laser from the Laser drop down box in the Control Panel.

Send the spectrograph to zero order (0 nm) using the icon in the Spectrometer section of the hardware toolbar.



Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Turn on the reference laser, and acquire a spectrum at zero order (0 nm) using the real time display (RTD) function. Ensure the detector is not saturated - if the signal is too intense, insert a filter in the laser path, reduce the confocal hole diameter, or decrease the acquisition time.

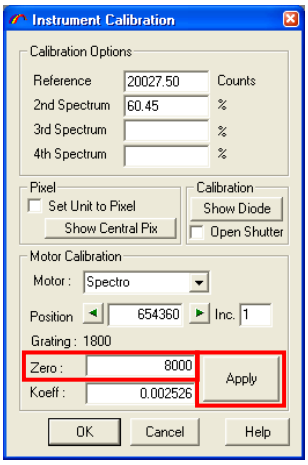
Stop the spectrum readout by clicking **[STOP]**.

Zoom in on the peak, using the Zoom icon in the Graphical Manipulation toolbar.

Use the cursor to locate the center of the zero order peak.

If the peak is within ±1 data point of 0 nm, the calibration is acceptable. If the peak is at a position greater than ±1 data point from 0 nm the calibration must be adjusted.

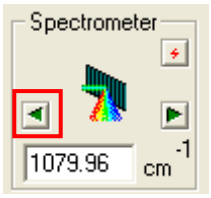
To do this click on Setup > Instrument Calibration to open the Calibration dialog window.



Adjust the ZERO parameter and then click the **[Apply]**. You should see the peak move. Continue to adjust the ZERO value until the band is within ±1 data point of 0 nm.

Click **[OK]** to save the calibration values for the current grating and close the Calibration dialog window.

Resend the spectrograph to zero order and retake the spectrum. This will make sure that your calibration changes have taken effect. Check the zero order position again and if necessary, make further adjustments (change ZERO, resend to zero, check position etc) until the position is acceptable.

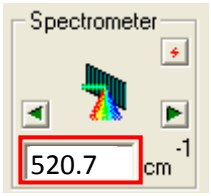


NOTE: The ZERO parameter should be changed in small increments e.g. ±5 at a time.

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

10.2. Calibration of Raman Peak (KOEFF)

Move the spectrometer to 520.7 cm^{-1} to analyse the silicon (Si) first order Raman peak.



Acquire a spectrum of the silicon (Si) sample using the real time display (RTD) function. Ensure the detector is not saturated - if the signal is too intense, insert a filter in the laser path, reduce the confocal hole diameter, or decrease the acquisition time.

Stop the spectrum readout by clicking **[STOP]**.

Zoom in on the peak, using the Zoom icon in the Graphical Manipulation toolbar.

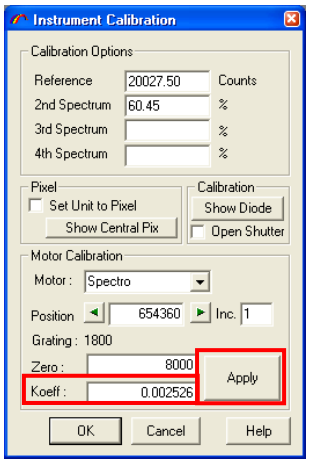
Use the cursor to locate the center of the 520.7 cm^{-1} silicon (Si) peak.

If the peak is within ±1 data point of 520.7 cm^{-1}, the calibration is acceptable. If the peak is at a position greater than ±1 data point from 520.7 cm^{-1} the calibration must be adjusted.

To do this click on Setup > Instrument Calibration to open the Calibration dialog window.

Adjust the KOEFF parameter and then click **[Apply]**. You should see the peak move. Continue to adjust the KOEFF value until the band is within ±1 data point of 520.7 cm^{-1}.

Click **[OK]** to save the calibration values for the current grating and close the Calibration dialog window.



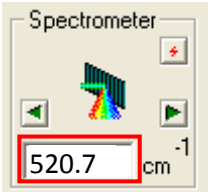
Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

10.3. Calibration of Additional Lasers

The process outlined above is used to calibrate the diffraction grating, using the reference laser. Additional lasers must be calibrated using the following procedure – each laser must be calibrated individually, using this procedure.

Select the laser to be calibrated from the Laser drop down box in the Control Panel.

Move the spectrometer to 520.7 cm^{-1} to analyse the silicon (Si) first order Raman peak.



Acquire a spectrum of the silicon (Si) sample using the real time display (RTD) function. Ensure the detector is not saturated - if the signal is too intense, insert a filter in the laser path, reduce the confocal hole diameter, or decrease the acquisition time.

Stop the spectrum readout by clicking **[STOP]**.

Zoom in on the peak, using the Zoom icon in the Graphical Manipulation toolbar.

Use the cursor to locate the center of the 520.7 cm^{-1} silicon (Si) peak.

If the peak is within ±1 data point of 520.7 cm^{-1}, the calibration is acceptable. If the peak is at a position greater than ±1 data point from 520.7 cm^{-1} the calibration must be adjusted.

To do this manually adjust (by left clicking and typing) the laser wavelength displayed in the Laser drop down box in the Control Panel and press **<enter ↵ >**.

Repeat this laser calibration procedure for all other lasers which are to be calibrated.

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

INDEX

3

3D image display
- Adjust shape and perspective 193
- Format and display options 224
- Select 3D display format 206

A

Absolute
- Positioning for multidimensional spectral arrays 98

Acquisition
- Multidimensional spectral array
  - Acquisition time per point 235
  - Number of accumulations per point 235
  - Start acquisition 96
- Spectrum
  - Acquisition time 235
  - Number of accumulations 235
  - Real time display (RTD) *See* Real time display (RTD)
  - Start acquisition 96
- Video
  - Start acquisition 102
  - Start extended video image acquisition 104

Acquisition menu 30
- Autofocus 59
- Custom info 30
- Detector 57
- Extended range 49
- Extra images 63
- Heat detector 66
- Options 34
- RTD 33
- Trigger 32

Acquisition parameters
- Accumulation mode 37
- Acquire spectrum with pixel units for X axis 73
- Acquisition time 235
- Auto exposure ..... *See* Auto exposure
- Auto save ..... *See* Auto save
- Autofocus ..... *See* Autofocus
- Denoise 46
- Intensity correction ..... *See* Intensity correction
- Mapping ..... *See* Multidimensional spectral array
- Multidimensional spectral array *See* Multidimensional spectral array
- Number of accumulations 235
- Photo-bleaching time ..... *See* Photo-bleaching time
- Scanning device 40
- Shutter mode 43
- Signal mode 41
- Spectral range ..... *See* Extended range
- Spike Filter ..... *See* Spike filter
- Templates ..... *See* LabAssistant

Add spectra ..... *See* Math

Adjust intensity ..... See Extended range

Alignment
- Use internal alignment diode 74

ARAMIS ..... *See* LabRAM ARAMIS

Aspect ratio 207

Auto exposure
- Configure 65
- Turn off 42
- Turn on 42

Auto save 47
- Turn off 49
- Turn on 49

Auto scanning ..... See Extended range

Autofocus
- Configure 60
- Set a focus offset 40
- Set when Autofocus is applied 39
- Status bar indicator 199
- The Autofocus procedure 60
- Turn off 40
- Turn on 40

Axes
- Format ..... *See* Format

B

Background subtraction ..... *See* Baseline correction

Baseline correction 115
- Add baseline points manually 180
- Attach baseline points to data 118
- Automatically subtract baseline 116
- Convert baseline to spectrum 116
- Fit baseline 116
- Options 117
- Remove baseline points manually 181
- Setting a baseline
  - For a multidimensional spectral array 120
  - For a single spectrum 118
- Subtract baseline 116

Baseline points
- Adjust baseline points manually ..... *See* Baseline correction

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Batch processing ..... *See* Multi
Big icon ..... *See* Icon bar
Binning factor
Detector image real time display (RTD) 33
Spectrum acquisition 36

C

Calibration
Instrument motors 74
Internal alignment diode 74
Manual procedure for LabRAM systems 247
Video images ..... *See* Video images
Camera
CCD camera for spectrum acquisition ..... *See* Detector
Video camera for optical visualisation ..... *See* Video images
Close data 11
Combine data
Combine individual spectral windows ... See Extended range
Confocal pinhole 228
Context help 91
Control panel 227
Acquisition 234
Data name tag 234
Filter 227
Hole 228
Instrument setup 238
Laser 227
Microscope objective 233
Options 231
Slit 229
Spectrometer 230
XYZ coords 236
Copy and paste formatting 18
Copy data 18
Cursors
Display values/positions 201
Format 218
Integral cursor 177
Multidimensional spectral array analysis cursors
Blue cursor
Activate 165
Format 220
Configure 147
Green cursor
Activate 165
Format 220
Red cursor
Activate 165
Format 220
Return to center of current window 92
Spectrum cursor 164
Custom info 30
Adding information 31
Adding new information categories 31
Deleting information categories 32
Cut data 18

D

Data
Auto save ..... *See* Auto save
Close 11
Custom information ..... *See* Custom info
Display
Format and scale 204
Legend 216
Overlay mode
Quick select single/overlay mode 195
Select mode 205
Spectrum format 217
Window layout ..... *See* Window menu
Extract 21
File formats 10
Get current range values 21
Label axes 21
Manually modify spectrum using pencil tool 167
Mathematical processing ..... *See* Math
Name tag in Control Panel 234
Normalize 121
Open 11
Peak searching and fitting ..... *See* Peak searching and fitting
Range and values 20
Icon 92
Redo the last action 18
Resize 21
Restore deleted data 18
Save all 11
Save as 11
Save picture as 12
Scale ..... *See* Scale
Selecting data objects
Using data list 19
Using selector radio tags 198
Split spectral array 11
Undo the last action 18
Zero 121
Data bar 195
Fast graph settings 197

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Quick select
Single or multiple data view 195
Selector radio tags 198
Data menu 19
Data range 20
Database search ..... *See* Spectral ID
Denoise ..... *See* Smoothing
Derivative
First 126
Second 126
Detector
Accumulation mode 37
Binning factor ..... *See* Binning factor
Configure 57
Dark subtract 41
Image real time display (RTD)
Configure 33
Shutter mode 43
Signal mode 41
Switching detector 201
Temperature
Set temperature 59
Status bar indicator 200
Warm up to room temperature 66
Diffraction grating 231
Manual exchange 232
Display ..... *See* Data
DuoScan 110
Modes of operation
Point 113
Scanning 111
Scanning zone 110
Using 111

E

Edit menu 17
Copy 18
Cut 18
Format... 18
Paste 18
Redo 18
Restore 18
Undo 18
Extended range 49
Adjust baselines of individual windows
After acquistion 133
During acquisition 55
Adjust intensity 55
Combine data 54
Combine individual windows
After acquisition 133
During acquisition 54
Icon 102
Modes of operation 50
Status bar indicator 200
Sub-pixel 52
Turn off 56
Turn on 56
Extended video 102
Acquire 104
Extra images 63
Acquire an image 64
Acquire an image during a map acquisition 64
What are they for? 63
Extract data 21

F

Factor analysis ..... *See* Modelling
Fiber entrance
XploRA 241
File formats 10
File menu 10
Close 11
Open 11
Page 13
Print preview 13
Print setup... 13
Print... 13
Save all 11
Save as 11
Save picture as 12
Split 11
Format
3D image display 224
Axes and labels
Fast settings 197
Properties
1D and 2D display 213
3D display 215
Copy and paste 18
Cursor ..... *See* Cursors
Display style 204
Scale behaviour 208
Fourier transform ..... *See* Smoothing

G

G.O. ..... *See* Guided Operation Wizard
Get current data range values 21

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Graphical manipulation toolbar 164
Add baseline points 180
Add constant 170
Add peak 172
Adjust peak 174
Axes 182
Axes3D 193
Circle mapping 189
Correct shape 167
Hor line mapping 187
Integral 177
Intensity shift 169
Line mapping 188
Map analysis cursors 165
Multiply by constant 171
Pointer 164
Points mapping 184
Polygon mapping 190
Rectangular mapping 187
Remove baseline points 181
Remove peak 176
Remove spike 166
Scale shift 169
SpImBlue 165
SpImGreen 165
SpImRed 165
Ver line mapping 190
Zoom 168
Graphical user interface 8
Guided Operation Wizard 82

H

Help
Context help 91
Online topics 88
Help menu 88
About LabSpec... 88
Help topics 88
Language 88

I

Icon bar 89
Big icon 89
Cursors and data information icons 91
Centre cursors 92
Data range 92
Intensity normalization 92
Scale normalization 91
Data acquisition icons 95
DuoScan 110
Extended range acquisition 102
Extended video 102
Mapping acquisition 96
Mapping properties 97
MultiPoint 104
Spectrum acquisition 96
Spectrum RTD (real time display) 95
Video 102
Data management icons 90
Help 91
Open 90
Print 91
Save 91
Data processing and analysis icons 114
Baseline correction 115
Create spectral profile 149
Fourier transform 127
Map analysis 147
Math 130
Modelling 154
Peak searching and fitting 134
Profile 145
Smoothing 124
Spectral ID search 114
Spectral normalisation and correction 120
Delete data icon 90
Delete 90
Small icon 89
Stop active function icon 163
Stop active function 163
Switch between "Big" and "Small" icons 89
Image
Color palettes 211
Contrast and brightness 212
Overlay map/score information on video image ... 222
Scale bar 222
Smoothing ..... *See* Smoothing
Information
Custom information ..... *See* Custom info
Parameters 92
Acquisition 94
Custom 94
History 95
Intensity correction 43
Apply correction after acquisition 45
Automatic correction during acquisition
Turn off 45
Turn on 44
How is the correction factor calculated 44
Select a filter 75

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Status bar indicator 199
Use with manually selected filters 75
Intensity profile 145

L

LabAssistant
Templates 76
Create 78
Custom 77
Default 76
Display templates in the Custom list 79
Organising 79
Save 78
LabAssistant menu
Create template 78
Custom templates 77
Default templates 76
G.O. (Guided Operation Wizard) 82
Manage templates 79
Label axes 21
Label peaks ..... *See* Peak searching and fitting
LabRAM ARAMIS
Hardware control 242
Measurement location 244
Measurement mode (point / line) 245
Polarization 244
Select detector 246
Select Visible or UV/IR optical path 246
Visualization 243
Instrument setup 238
Turn on laser 238
Language 88
Laser
Create macro spot ..... *See* DuoScan
Polarization ..... *See* Polarization
Power filter 227
Reduce power 227
Scan spot over area ..... *See* DuoScan
Selecting laser wavelength 227
Set laser spot marker position on video image 67
Turning on
LabRAM ARAMIS 238
XploRA 238
Layout of LabSpec 5 software 8
Legend 216
LineScan
Activate LineScan for XY mapping 40
Scale the video image for the scan size 71
Log-in password ..... *See* User log-in profiles

M

Map ..... *See* Multidimensional spectral array
Math 130
Drag spectrum with mouse to add constant 170
Drag spectrum with mouse to multiply by constant 171
Mathematical manipulation ..... *See* Math
Menu bar 10
Acquisition 30
Data 19
Edit 17
File 10
Help 88
LabAssistant 76
Options 22
Scripts 82
Setup 73
Video 66
Window 86
Microscope objective 233
Modelling
Display
Error map 156
Model sum 156
How to automatically create a model 161
How to manually model data 157
Using previously saved reference spectra 160
Load current spectrum 156
Load multiple spectra 156
The "Create" factor analysis procedure 155
Set number of factors 155
Start 157
The DCLS modelling procedure 154
Normalized 154
Unnormalized 154
Threshold data 155
Montage video images ..... *See* Extended video
Motorized sample stage
Move by inputting coordinates 236
Switching stage 237
Viewing coordinate position 236
Motors
Calibrate 74
Reinitialize 75
Multi (batch processing) 23
Multidimensional spectral array
Acquisition
Measurement order 99
Changing the order 101
Parameters 97

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Start acquisition 96
Use SWIFT for ultra-fast acquisition 99
Adding a new array dimension 100
Baseline correction 120
Correct spectrum in array 148
Cursors for aray analysis ..... *See* Cursors
Define position on video image
Circle 189
Line
Diagonal 188
Horizontal 187
Vertical 190
Points 184
Polygon 190
Rectangle 187
Deleting an array dimension 101
Factor analysis ..... *See* Modelling
Image properties ..... *See* Image
Mean spectrum
From selected area 219
From selected points 219
Modellling ..... *See* Modelling
Overlay map/score information on video image ... 222
Peak searching and fitting ..... *See* Peak searching and fitting
Restore "Point" window if it has been deleted 148
Save all spectra in array as individual files 11
Spectral profile
Add spectrum to profile 152
Create from individual spectra 151
Delete spectrum from profile 153
Insert spectrum into profile 152
Threshold data 122
Multiply spectra ..... *See* Math
Multipoint acquisition
Marking points on video image 184
Using XYZ coordinate list 104
Creating a list 109
Note about coordinates used 110
Saving data 107
Multiwindow ..... See Extended range

N

Neutral density filter 227
Normalize 121
Modes 123

O

Objective ..... *See* Microscope objective
Open data 11
Options menu 22
Multi 23
Pressure unit 23
Profiles... 25
Template 29
Unit 22
Overlay
Data for display ..... See Data: Display
Map/score information on video image 222

P

Paste data 18
Peak area
By cursor 177
By fitting 135
Peak pick ..... *See* Peak searching and fitting
Peak searching and fitting 134
Add peak to spectrum 172
Display options 143
Display peak parameters 138
Fitting
Adjust peak position and shape manually 174
Create image of fit parameters (for multidimensional spectral array) 139
Fit 137
Options 136
Remove peak manually 176
Shape function
Define custom shape 144
Select 135
Variables
Add variables 141
Configure 140
Delete variables 142
Searching
Adjust peak position manually 174
Label peak manually 172
Options 135
Remove peak manually 176
Search 136
Pen tool 167
Pencil tool 167
Photo-bleaching time 35
Status bar indicator 199
Turn off 36

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Turn on 35
Pointer ..... *See* Cursors
Polarization
Control laser polarization
LabRAM ARAMIS 244
XploRA 240
Control Raman polarization
LabRAM ARAMIS 244
XploRA 240
Polarizors ..... *See* Polarization
Pressure units 23
Printing functions 13
Print template page 13
Profile
Intensity profile across 2D image. *See* Intensity profile
Spectral ..... *See* Multidimensional spectral array
User log-in profiles ..... *See* User log-in profiles

R

Real time display (RTD)
Acquisition time 234
Detector image read out RTD mode
Configure 33
Start acquisition 96
Spectrum read out RTD mode
Start acquisition 95
Reinitialize instrument 75
Relative
Positioning for multidimensional spectral arrays 98
Report function 13
Rescale ..... *See* Scale
Resize data 21
Resolution
Controlling depth resolution with confocal hole ... 228
Controlling spectral resolution
WIth diffraction grating 231
With slit 229
Right click menus 203
Axes 213
Blue cursor 220
Centre cursors 212
Cursor 218
Fast settings 209
Format and scale 204
Green cursor 220
Image 221
Image colors 210
Image3D 224
Imposition 222
Legend 216
Red cursor 220
Rescale 209
Scale bar 222
Spectrum 217
Swap X axis 209
Swap Y axis 210
RTD ..... *See* Real time display (RTD)

S

Save
Options for saving data 12
Save all data 11
Save all spectra in array as individual files 11
Save as 11
Save picture as 12
Savitsky-Golay ..... See Smoothing
Scale
Format scale behaviour 208
Rescale
All axes 91
Drag spectrum with mouse to rescale 169
Intensity 92
Drag spectrum with mouse to rescale 169
Scale bar for images 222
Scale data manually (shift, stretch, compress axis) .. 21
Set scale of video images ..... *See* Video images
Scanner ..... *See* LineScan
Scripts 82
Add scripts to menu list 85
Apply a script before/after acquisition 85
Edit 84
Load and manage 83
Menu list 86
Remove scripts from menu list 85
Trigger 85
Use scripts to control motors 86
Scripts menu 82
Options 83
Scroll bars 207
Setup menu 73
ICS Filters 75
Instrument calibration 73
Instrument init 75
Slit 229
Small icon ..... *See* Icon bar
Smoothing
Data
Denoise
After acquisition 124
Automatic Denoise during acquisition 46

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Turn off 47
Turn on 47
Fourier transform 127
Median 126
Savitsky-Golay 125
Image pixel smoothing *221*
Spectral database ..... *See* Spectral ID
Spectral ID
Configuring LabSpec correctly 114
Start search from LabSpec 114
Using ..... *See separate Spectral ID manual*
Spectral profile ..... *See* Multidimensional spectral array
Spectral range ..... *See* Extended range
Spectrometer
Select diffraction grating ..... *See* Diffraction grating
Send to zero order reference position 230
Spectral position 230
Spectrum display ..... *See* Data
Spike filter
Automatic spike filter
After acquisition 126
During acquisition 37
Turn off 38
Turn on 38
Manually remove spike after acquisition 166
Split spectral array 11
Status bar 199
Active options 199
Cursor values 201
Detector temperature 200
Progress bar 201
System messages 199
Stitch video images ..... *See* Extended video
Sub-pixel ..... *See* Extended range
Subtract spectra ..... *See* Math
SWIFT ultra-fast mapping .See Multidimensional spectral array

T

Temperature
Operating temperature of detector ..... *See* Detector
Spectral profile ... *See* Multidimensional spectral array
Templates ..... *See* LabAssistant
Threshold 122
Topography
Acquire topography image ..... *See* Extra images
Use Autofocus to analyse rough samples ..... *See* Autofocus
Trigger
Apply a script before/after acquisition 85
Trigger message window 32

U

Units 22
Custom units 24
Pressure units 23
User log-in profiles 25
Changing a user profile password 28
Creating a new user profile 27
Log in during a session 27
Log-in at start 26
User levels 25

V

Version number 88
Video images
Aspect ratio 207
Brightness and contrast 212
Camera configuration 67
Default X axis display 209
Default Y axis display 210
Define multidimensional spectral array position ... 184
Extended video image ..... *See* Extended video
List of installed cameras 72
Overlay map/score information 222
Scale bar 222
Selecting a camera 72
Set the image scale 68
Manually 70
Using 68
Set the laser spot marker position 67
Set the LineScan image scale 71
Start acquisition 102
Video menu 66
Format 67
Laser position 67
List of installed cameras 72
Offsets 67
Source 67
Video image scale 68
Visual basic scripting ..... *See* Scripts

W

Warm detector to room temperature 66
Window menu 86
Cascade 87

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA

Tile 87

X

X axis
Reverse display 209
Units 23
XploRA
Hardware control 239
Adjustment camera 240
Fiber entrance 241
Microscope 239
Polarizors
For laser 240
For Raman 240
Re-initialise 242
White lamp 241
Instrument setup 238
Turn on laser 238

Y

Y axis
Reverse display 210
Units 23

Z

Zero data 121
Zero order position
Manual calibration ..... *See* Calibration
Send spectrometer to zero order 230
Zoom 168

Explore the future Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific HORIBA